Item No.

THE CORPORATION OF THE CITY OF WINDSOR
Building and Development Department

MISSION STATEMENT:
"The City of Windsor, with the involvement of its citizens, will deliver effective and responsive municipal services, and will mobilize innovative community partnerships"

BASIS Report Number: 11180	**Report Date: February 23, 2005**
Author's Name: Don Wilson, MCIP RPP Andre J. Quaglia	**Date to Council: March 21, 2005**
Author's Phone: 519 255-6281 ext.6392	**Classification #: Administration**

To: **Mayor and Members of City Council**

Subject: **Lighting Intensity Standards and Study (LISS)**

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1. RECOMMENDATION: **City Wide: X Ward(s): ____**

That the March 21, 2005 report **BE TABLED** for a 4 week period (April 18) for the industry to review and comment.

I. That the following Guiding Principles **ARE ADOPTED** for the lighting of private lands, subject to Site Plan Control approval, in the City of Windsor and will be incorporated into a Lighting Standards Manual:

a. Contribute to personal safety
b. Support the supervision of secure areas
c. Assist in wayfinding
d. Conserve energy
e. Preserve the experience of the night sky
f. Respect the privacy of residential space
g. Respect animal habitat
h. Heighten the enjoyment of public space and nighttime activity
i. Apply the above listed guiding principles consistently
j. Lead by example (City of Windsor);

II. That to ensure the provision of adequate and safe full cut off lighting levels, bonding for the provision of on-site lighting **BE REQUIRED** as a condition of site plan approvals as warranted.

III. That lighting plans and photometric charts (as required) **BE PREPARED**, and all lighting **BE INSTALLED and MAINTAINED** by the applicant, in accordance with lighting plans, to their best ability, (for all developments sites of 25,000 square feet or greater) and approved and enforced by the Chief Building Official.

IV. That the 2005 review of the Official Plan **INCORPORATE** lighting policies in the Official Plan.

V. That the Sign By-Law 250-2004 **BE REVIEWED** with regards to externally lit billboards and electronic changing copy signs and their impact on the night sky and traffic safety;

VI. That lighting requirements for existing development, as included in the Property Standards By-law, **BE REPORTED** by Administration (Inspection Services Section) to Council.

VII. That lighting requirements for public sector City rights-of-way and other publicly owned lands **BE REPORTED** by Administration (Street Lighting Committee) to Council.

VIII. That all Site Plan Control applications in their review and approval **SHALL HAVE REGARD** to the Guiding Principles in Recommendation I and implement as required the techniques included in Techniques to Implement Lighting Guiding Principles; Table I Illumination Requirements; Table II Guidelines for Structure Lighting and Illustrations, as follows:

Techniques To Implement Lighting Guiding Principles:

a. (Contribute to personal safety)

i. Locate lamps so as to avoid glare
ii. Provide additional shielding of lamp fixtures to avoid glare
iii. Provide minimum illumination in accordance with Table 1: Illumination Requirements
iv. Provide uniform lighting without sudden light to dark transitions
v. Provide overlap of light distribution
vi. Provide illumination to articulate steps
vii. Coordinate spacing and height of lamps with landscaping to ensure lighting coverage is not interrupted by tree canopies

b. (Support the supervision of secure areas)

i. Provide illumination in accordance with Table 1: Illumination Requirements
ii. Provide good colour rendering for identification purposes using Metal Halide lamps
iii. Provide sufficient lighting coverage including building recesses or inside corners

c. (Assist in wayfinding)

i. Provide illumination to improve legibility of nodes, landmarks and circulation areas
ii. Align lamps in consistent, recognizable, and unambiguous patterns
iii. Provide a uniform and modest brightness along paths of travel

d. (Conserve energy)

i. Employ alternatives to incandescent or mercury vapour lamps
ii. Maintain light levels within recommended range set out in Table 1
iii. Dim down lighting to minimum levels after normal operating hours

e. (Preserve the experience of the night sky)

i. Provide full cut-off lighting (zero percent of peak intensity radiating above 90 degrees and 10 percent of peak intensity above 80 degrees)
ii. Employ low cut-off where full cut-off lighting alternatives are not feasible
iii. Beacon lights are strongly discouraged unless the use requires such lighting

f. (Respect the privacy of residential space)

i. Locate lamps to direct light away from neighbouring properties
ii. Provide supplementary shielding of lamps to direct light away from neighbouring properties
iii. Provide lamp fixture mounting heights that avoid glare to the vantage point of neighbouring residential units
iv. Provide recessed light fixtures that avoid glare to the vantage point of neighbouring residential units

g. (Respect animal habitat)

i. Direct illumination away from abutting City Parks and naturalized areas on abutting private lands

h. (Heighten the enjoyment of public space and nighttime activity)

i. Provide minimum illumination to encourage nighttime use
ii. Minimize glare using shielding or fully recessed light fixtures, as required
iii. Reveal the salient features of a site using a combination of diffused and spot lighting

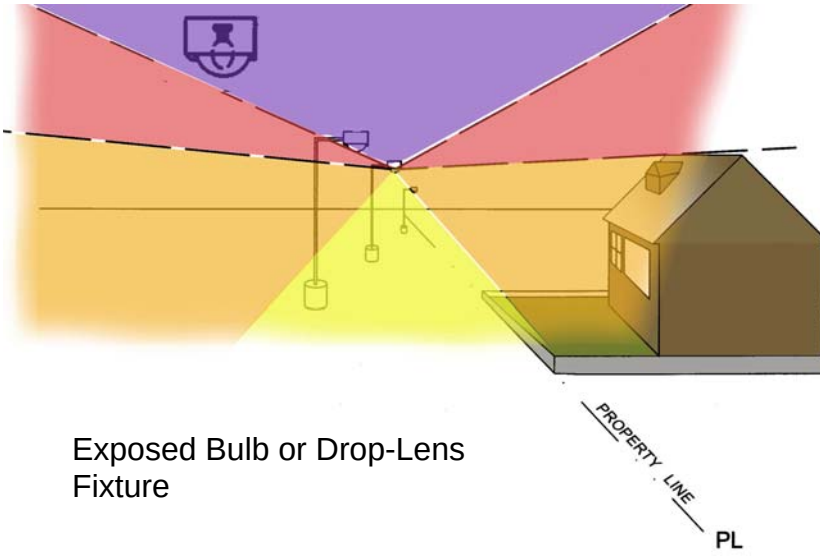
i. Apply the above listed standards consistently

i. Provide photometric plans and lamp specifications for use by City staff in the review of site plan applications (development sites of 25,000 square feet or greater) and for inclusion in site plan development approval agreements
ii. Incorporate the above-mentioned techniques, including illustrative examples, as part of a site plan design manual that is available to both City staff and site plan applicants

Table I: Illumination Requirements	
Uses	Horizontal Illumination (in footcandles)
Uncovered Parking Areas	0.5 - 4.0
Covered Parking Areas	2.0 - 10.0
Covered Outdoor Area	0.5 - 10.0
Walkways	0.5 - 2.0
Principle Building Entrances	3.5 - 8.0
Loading and Garage Storage Areas	1.0 - 2.0
Covered Gas Pumping Areas	5.0 - 25.0
Outdoor Active Recreation Facilities	0.0 – 150.0
Auto Dealership Display	1.0 - 8.0
Outdoor Storage Yard	1.0 - 2.5
All Non-Residential uses at normal non-business hours (11:00pm to 5:00am) and when employees other than security personnel are not present	0.5 - 2.0
All Other Uses	0.0 - 2.0
None of the minimums apply to adjacent property line Requires that illumination levels at all property lines are between 0.0 and 5.0 footcandles Fully shielded is assumed in all references Luminaries will be full cut off unless otherwise not applicable	

Table II: Guidelines For Structure Lighting
1. The illumination of structures that consist of uniformly dark materials or that contain reflective-coated glass is discouraged.
2. The illumination of tall, slender structures or monuments, such as flagpoles, where stray light is difficult or impossible to control, is discouraged.
3. Equip luminaires with devices to eliminate stray light as much as possible. Examples of such devices are four-sided shields, internal louvers, and top visors.
4. Locate structure lighting luminaires in places where the unshielded light source cannot be seen be pedestrians or motorists.
5. Average illuminance levels (vertical, measured at the structure face): a. Bright surroundings and light surfaces: 1.0 to 5.0 footcandles b. Bright surroundings and medium surfaces: 1.0 to 6.0 footcandles c. Dark surroundings and light surfaces: 0.5 to 2.0 footcandles d. Dark surroundings and medium surfaces: 0.5 to 3.0 footcandles
Definitions
Full Cut Off Lighting - "A light fixture constructed in such a manner that all light emitted by the fixture, either directly from the lamp or a diffusing element, or indirectly by reflection or refraction from any part of the luminaire, is projected below the horizontal." Horizontal Illuminance - "The measurement of brightness from a light source, usually measured in footcandles or lumens, which is taken through a light meter's sensor at a horizontal position." Vertical Illumination – "The measurement of brightness from a light source, usually measured in footcandles or lumens, which is taken through a light meter's sensor at a vertical position."

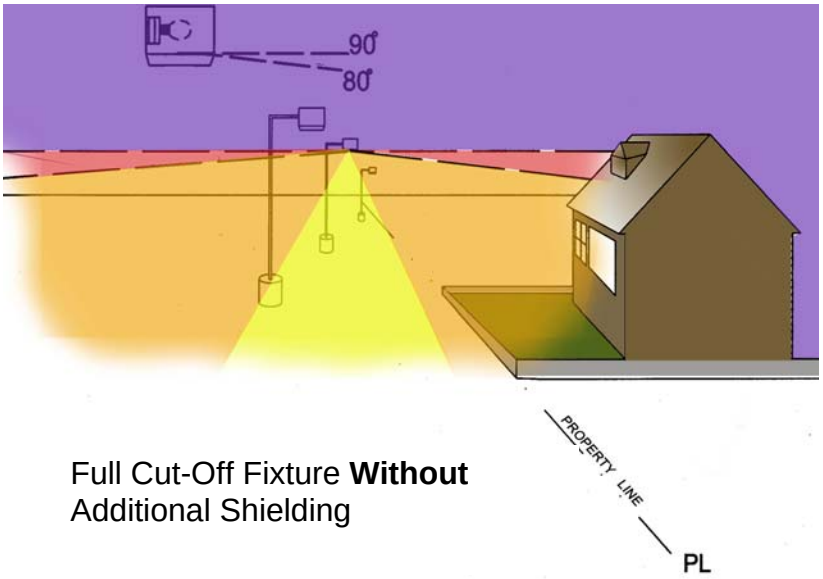
Illustrations



Exposed Bulb or Drop-Lens Fixture

ILLUSTRATION A

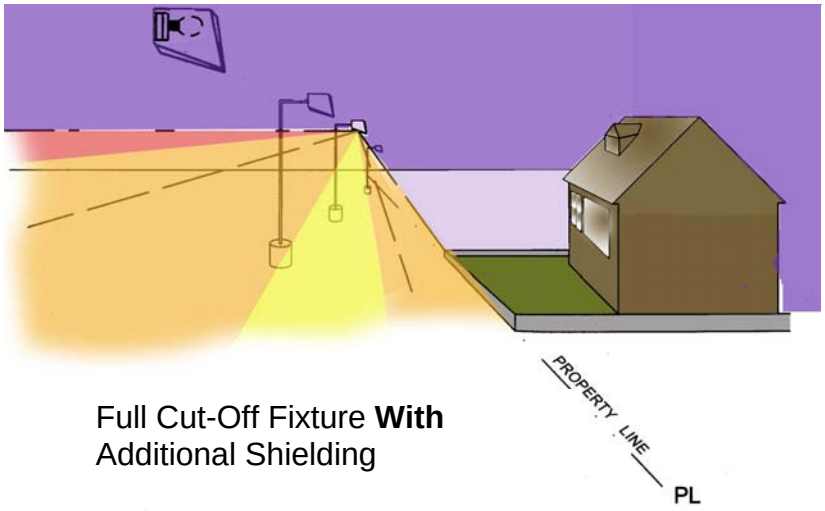
- Does **not** deflect light away from abutting lot as required
- Emits light **above** the horizontal thereby contributing to halo of wasted light in night sky
- Glare is experienced far beyond site



Full Cut-Off Fixture **Without** Additional Shielding

ILLUSTRATION B

- A full cut-off fixture emits zero light intensity above 90 degrees and only 10 percent of its intensity between the 80 and 90 degree angles. The greatest intensity from a full cut-off fixture occurs in the area directly below the fixture
- Does **not** deflect light away from abutting lot as required
- Light is limited to below the horizontal



Full Cut-Off Fixture **With** Additional Shielding

ILLUSTRATION C

- Deflects light away from neighbour's property
- Light is limited to below the horizontal
- Glare is eliminated except from specific vantage points

EXECUTIVE SUMMARY:

N/A

2. BACKGROUND:

On December 8, 2003, by Council Resolution 747/2003, City Council approved the following with respect to Lighting Intensity Standards;

"V. That the existing Property Standards By-law continues to BE USED in existing developments to regulate lighting nuisance as enacted under the new Municipal Act;

VI That the lighting intensity standards included in the lighting Handbook "Illuminating Engineering Society of North America (IESNA 2000)" BE ADOPTED as guidelines for immediate inclusion in site plan control agreements for the protection of adjoining properties (full cut off lighting) and provide bonding to ensure satisfactory lighting intensity in proposed developments;

VII. That a new Lighting Intensity Standards Report /By-law BE REPORTED back to Council."

In August of 2004, a Lighting Intensity Working Group was established consisting of volunteers concerned with light pollution. The group was composed of architects, consultants, as well as resource staff from City departments (Building and Development, Windsor Police Services, Parks, Urban Design and Community Development, and ENWIN).

As noted in the September 13, 2004 interim report to Council, a phased approach to the Study was established. A by-law is mentioned in CR 747/2003. This report is not intended to cover the request for a By-law. Activity b), listed below, deals with a By-law.

a) The first (subject) phase deals with new development through the site plan control process.

b) Subsequently and subject of further study and report to Council in 2005 will be the review of lighting within existing development (by-law /regulations Property Standards, Municipal Act).

c) The final phase of the overall review will deal with lighting within the City rights-of-way and other public lands (i.e. Streets and Parks).

3. DISCUSSION:

Survey Results/Working Group Findings

To research how other municipalities in Ontario regulate lighting intensity, the Working Group formulated a survey that was electronically sent to 27 Ontario municipalities. A total of 10 municipalities responded, including Ottawa, Mississauga, London, Kitchener, St. Catharines, Kingston, Cambridge, Thunder Bay, Richmond Hill, and Mississippi Mills.

Results from the survey indicated a significant trend towards applying lighting intensity standards to new private developments through a Site Plan Control Agreement. A majority of respondents indicated that technical specifications and bonding requirements were the most popular Site Plan Control provisions for lighting. A majority of respondents indicated that complaint based enforcement was the primary method of enforcing light trespass and other lighting related nuisances.

Of those Ontario municipalities that responded to the survey, only two have established a separate by-law to regulate lighting. Both of these municipalities, Richmond Hill (required private provincial legislation) and Mississippi Mills are strategically located within close proximity to an observatory requiring specific protection of the night sky. Other municipalities, such as Kitchener, address lighting concerns by including design guidelines as part of their site plan control process. Accordingly the Working Group felt that the use of design guidelines is the appropriate and proactive method to deal with the matter. Existing development requires a separate approach to enforcement and will be dealt with in a future report to Council (Recommendation VI).

A review by the Legal Department found nothing in Section 34 of the Planning Act that allows the municipality to regulate lighting and therefore lighting requirements cannot be addressed in the Zoning Bylaw. However, the Municipal Act does provide the municipality with authority to regulate this matter. Currently, problems related to lighting concerns on existing developments, are handled by complaints to the Inspection Managers. A review of by-law/regulations under Property Standards as included in the Municipal Act will be part of the future review of lighting within existing development. A bylaw under the provisions of the Municipal Act could be proposed.

To achieve a full understanding of the lighting problems, a night site survey was conducted by the Lighting Intensity Working Group. With the use of a light meter it was determined that a number of site plan control sites had a wide variety of readings, many results were considered obtrusive and invasive to adjoining properties. From the night survey, the range of illumination levels became apparent. At another Working Group session, a Professional Engineer, who prepares lighting and photometric plans, attended and gave insight into the preparation of lighting plans. Throughout the process, members of the Working Group provided substantial information concerning the expectations of the lighting industry and the need for control of light trespass.

Through the process it was determined that the most appropriate method of dealing with the issue was to put forward guiding principles and include the techniques that would assist both the Administration as well as the public to understand and adhere to these Guiding Principles. This can be done as part of the existing site plan review process, rather than through a new by-law.

Using the Guiding Principles, the design of new developments is expected to do the following: (a) contribute to personal safety, (b) support the supervision of secure areas, (c) assist in way finding, (d) conserve energy, (e) preserve the experience of the night sky, (f) respect the privacy of residential space, (g) respect animal habitat, (h) heighten the enjoyment of public space and night time activity, and (i) to apply these standards consistently and (j) to lead by example (City of Windsor).

A range of light levels in Table I is specified for different site functions (i.e. principle building entrance) instead of for land uses (i.e. retail, institutional, etc.). Similarly, Table II provides

Guidelines for Structure Lighting, including definitions and illustrations for such terms as 'full cut-off lighting'. The illustrations serve to explain why full cut-off lighting, although an important criteria, is not in itself sufficient to address concerns of light trespass. As a result, further techniques must be employed that are specific to the context of each development and therefore lighting details would be required on all site plans. It is noted that when lighting is warranted, it will be provided in accordance with these design guidelines. However, only major developments (25,000 square feet or greater in site area) would be required to provide separate lighting and/or photometric drawings prior to receiving a building permit. Staff within the Building and Development Department would review and approve these drawings. The enforcement would be through the permit inspection process (after hours as required). Bonding is recommended similar to the landscaping, curbing and screening fence requirements on all developments to ensure compliance. The Working Group identified the Sign By-law should be reviewed with regards to lighting standards for certain types of signs (Recommendation V).

4. FINANCIAL MATTERS:

The Lighting Intensity Standards and Study was completed with the assistance of a student program, volunteer hours and staff overtime. The summer career placement for the student who assisted was approximately $7000.00.

With regards to the above-mentioned lighting standards, all costs, including security deposits or bonds, are the responsibility of the applicant through a Site Plan Control Agreement.

5. COMMUNITY STRATEGIC PLAN

The need to improve the visual impression and safety of the City and residents is identified as an Action Item in the Community Strategic Plan. Specifically, the Guiding Principles are in keeping with Objective Three (3) of the Sustainable Healthy Environment theme; *"To plan for the efficient, attractive and environmentally sound use of land."* This recommendation also implements Objective One (1) of the Safe Caring Diverse Community theme; *"To provide for the safety and protection of all residents visitors and property owners."*

6. CONSULTATIONS:

In the search for potential volunteers for the Working Group from the community, information letters were sent to individuals, organizations, and community stakeholders in early July of 2004. Seven individuals from the community comprised the Lighting Intensity Working Group. They included representatives from the Royal Astronomical Society of Canada, Greater Windsor Home Builders Association, architects, consultants, as well as resource staff from a number of service units (Building and Development, Windsor Police Services, Parks, Urban Design and Community Development, and ENWIN).

Lighting requirement surveys were sent to 27 municipalities. They include Toronto, Ottawa, Mississauga, Hamilton, London, Brampton, Markham, Kitchener, Vaughan, Sudbury, Burlington, Oakville, Oshawa, Richmond Hill, St. Catharines, Kingston, Cambridge, Thunder Bay, Guelph, Barrie, Whitby, Pickering, Waterloo, Brantford, Niagara Falls, Sault Ste Marie, and Mississippi Mills. As noted in the discussion, a total of ten municipalities responded to the Questionnaire.

7. CONCLUSION:

The creation of lighting standards for new development is an important initiative considering the concerns raised by the community regarding light trespass and deterioration of the night time environment.

The results of the Ontario-wide light survey indicate that a specific lighting by-law is only warranted where an astronomical observatory requires preservation of night sky conditions.

The best way to implement the recommended principles is through the site plan review approval and process. The resulting lighting design and controls will be enforced for new developments on private property by site plan agreements. These guidelines will not apply to existing developments unless they are redeveloped.

The Guiding Principles reflect the many applications of lighting that exist within the City. This includes utilizing lighting for the purpose of work place safety, personal security, and aesthetics. Accordingly, providing consistency of guidelines and techniques that will assist to achieve these goals will provide the establishment of minimal illumination levels, while trying to increase overall energy efficiency and control offensive lighting. Included in the recommendation are techniques to implement the Guiding Principles (Appendix A), including Tables I and II with a range of lighting illumination levels and guidance for lighting of building and structures as well as definitions and illustrations. These will be utilized consistently by both Applicant and Administration in the preparation and approval of site plan applications. These Guiding Principles will be incorporated into a Lighting Standards Manual.

Working Group Members felt it is also important to be proactive and educate the public on the issue of lighting pollution in order to reduce light trespass and preserve the night sky environment. Addressing urban design, landscaping, architectural, and environmental factors will help to set positive examples for others within the community. The City ought to lead by example in achieving compliance with the Guiding Principles and Techniques.

To provide further consistency, it is also recommended that in the 2005 review of the Official Plan the Guiding Principles and Techniques (Appendix A and Tables and Illustrations) be incorporated within the review. Similarly the Sign Bylaw should be reviewed to ensure consistency with these guidelines.

The regulation of lighting is only included within the provisions of the Planning Act dealing with Site Plan Control, i.e. *"provide to the satisfaction of and at no expense to the municipality . . . facilities for the lighting, including floodlighting of the land or of any buildings or structures thereon."* The Municipal Act provides the municipality with regulatory authority concerning existing lighting; however, this part of the Light Intensity Study deals with only new development requiring Site Plan approval.

The next phase of the lighting study will address the enforcement for existing development and the application of these same principles and techniques for providing rules for existing development. This final phase of the study will examine the need for a bylaw to deal with outdoor illumination under the provisions of the Municipal Act. It is suggested the Inspection Services Section of Building and Development Department administer this part of the study, as

most enforcement matters are complaint driven. The application of the Guiding Principles and Techniques to rights-of-way and other public lands is recommended based on the principle of consistency throughout the entire municipality. The Street Lighting Committee should therefore incorporate Recommendation VII into its programme.

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